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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
BURD, KEVIN MICHAEL	

ART UNIT	PAPER NUMBER
2631	

DATE MAILED: 12/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/395,490	JOHNSON ET AL.	
	Examiner	Art Unit	
	Kevin M. Burd	2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28 and 30-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-13,15-25,27 and 30-34* is/are rejected.

7)☒ Claim(s) *6,14 and 26* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. This office action, in response to the remarks filed 10/4/2005, is a non-final office action.

Response to Arguments

2. Applicant's arguments stated in pages 2 and 3 of the remarks filed 10/4/2005 with respect to the rejections of claims 16, 27 and 28 under 35 USC 102(e) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, new grounds of rejection are made in over Jones in view of Shin and Perkins as stated below.

3. Applicant's arguments filed 10/4/2005 have been fully considered but they are not persuasive for claims 1-5, 7-13, 15, 17-25 and 30-34. The examiner agrees that Jones does not illustrate a receiver that samples the RF signals as claimed. However Shin discloses measuring energy at a frequency offset from the carrier frequency as stated in the previous office action. Jones discloses measuring the spectrum of the baseband signals and determining, from a comparison, the amount of out-of-band signal energy (column 11, lines 16-23). The predistorter is adjusted accordingly. Shin discloses a method and apparatus of measuring and removing this out-of-band interference.

Applicant states Shin does not disclose that predistortion is applied to a baseband signal. Shin implies that the predistortion technique is applied to an RF signal. However, Jones discloses applying predistortion to a baseband signal. The

teachings of Shin would be incorporated into the apparatus and method of Jones. Therefore, the band of the combination would be baseband.

For these reasons and the reasons stated in the previous office action, the rejections to claims 1-5, 7-13, 15, 17-25 and 30-34 are maintained and restated below.

Claim Objections

4. Claim 28 is objected to because of the following informalities: line 1 states the method set forth in claim 27. However and apparatus is set forth in claim 27. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US 5,920,808) in view of Shin et al (US 6,493,543).

Regarding claim 27, Jones discloses an apparatus and method for adaptively predistorting a baseband signal (figure 2). The predistorter 107 predistorts the received in-phase and quadrature component signals to compensate for the distortion of the power amplifier 115. The predistorted 800 ksps component signals from the predistorter

107 are received by the digital interpolator 209 (column 7, lines 22-29). The signals are upsampled in the digital interpolator to increase the sampling (column 7, lines 28-42). The interpolator filters the upsampled base band signal (column 7, lines 42-43). Filtering the signals eliminates high frequency harmonics in the system (column 4, lines 35-47). The output of the interpolator is a predistorted upsampled signal, which is converted to RF signal for transmission. A receiver retrieves samples of the RF signals and feeds these signals to the trainer 131 (figure 2).

Jones does not disclose the receiver being tuned to at least one specific frequency offset from a carrier frequency of the output signal. Shin discloses the control system 104 measures the energy of the distortion frequency components by measuring energy at a frequency or frequency offset from a carrier frequency. The feedback control signal on line 109 is coupled to the predistorter 105 for adjusting characteristics of the predistorter and thereby null the energy in the out-of-band signals on line 103 (column 5, lines 33-45). It would have been obvious for one of ordinary skill in the art at the time of the invention to incorporate the teachings of Shin into the apparatus and method of Jones to measure the energy of distortion frequency components and to remove out-of-band signals. This would remove noise from the signal to be transmitted and allow error free transmissions to be sent to the receiver.

6. Claims 1-3, 8-12, 15, 16, 18, 19, 22-24, 28, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US 5,920,808) in view of Shin et al (US 6,493,543) further in view of Perkins et al (US 5,963,549).

Regarding claims 1, 9, 12, 16, 18, 19, 22, 24, 31 and 32, Jones discloses an apparatus and method for adaptively predistorting a baseband signal (figure 2). The predistorter 107 predistorts the received in-phase and quadrature component signals to compensate for the distortion of the power amplifier 115. The predistorted 800 ksps component signals from the predistorter 107 are received by the digital interpolator 209 (column 7, lines 22-29). The signals are upsampled in the digital interpolator to increase the sampling (column 7, lines 28-42). The interpolator filters the upsampled base band signal (column 7, lines 42-43). Filtering the signals eliminates high frequency harmonics in the system (column 4, lines 35-47). The output of the interpolator is a predistorted upsampled signal, which is converted to RF signal for transmission. A receiver retrieves samples of the RF signals and feeds these signals to the trainer 131 (figure 2).

Jones does not disclose the receiver being tuned to at least one specific frequency offset from a carrier frequency of the output signal. Shin discloses the control system 104 measures the energy of the distortion frequency components by measuring energy at a frequency or frequency offset from a carrier frequency. The feedback control signal on line 109 is coupled to the predistorter 105 for adjusting characteristics of the predistorter and thereby null the energy in the out-of-band signals on line 103 (column 5, lines 33-45). It would have been obvious for one of ordinary skill in the art at the time of the invention to incorporate the teachings of Shin into the apparatus and method of Jones to measure the energy of distortion frequency components and to remove out-of-band signals. This would remove noise from the signal to be transmitted and allow error free transmissions to be sent to the receiver.

The combination of Jones and Shin does not disclose clipping the signal in the predistorter. Perkins discloses it is well known to clip signals in a predistortion unit to reduce power requirements prior to transmission. Using a lookup table memory technique helps achieve this lower power consumption (column 2, lines 30-44). It would have been obvious for one of ordinary skill in the art at the time of the invention to use the predistortion unit of Perkins to clip a baseband signal using a look up memory technique for the reason stated above.

Regarding claims 2 and 10, Jones discloses upconverting the 800 ksps signals to 3.2 Msps signal (column 7, lines 30-45).

Regarding claims 3, 11 and 23, Perkins discloses the I and Q components are summed prior to recovering lookup table information (column 2, lines 30-44).

Regarding claims 8 and 15, the signal is delayed by elements 112, 113 and 115 prior to being output of the system (Jones figure 2).

Regarding claim 28, the combination of Jones and Shin discloses the apparatus stated in paragraph 5. The combination of Jones and Shin does not disclose clipping the signal in the predistorter. Perkins discloses it is well known to clip signals in a predistortion unit to reduce power requirements prior to transmission. Using a lookup table memory technique helps achieve this lower power consumption (column 2, lines 30-44). It would have been obvious for one of ordinary skill in the art at the time of the invention to use the predistortion unit of Perkins to clip a baseband signal using a look up memory technique for the reason stated above.

7. Claims 4, 5, 7, 13, 20, 25 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US 5,920,808) in view of Shin et al (US 6,493,543) further in view of Perkins et al (US 5,963,549) as applied to claims 1-3, 8-12, 15, 16, 18, 19, 22-24, 28, 31 and 32 above, and further in view of Miyashita (US 6,288,610).

Regarding claims 4, 5, 7, 13, 20, 25 and 33, the combination of Jones, Shin and Perkins disclose an apparatus and method for adaptively predistorting a baseband signal as stated above. The combination does not disclose using the lookup table technique to predistort the baseband signal where the distortion characteristics are defined by polynomial equations having coefficients. Miyashita discloses the predistortion characteristics are defined by the polynomial equation shown in column 4, lines 60-68. The equation g(x) is the expression of the envelope transfer function. It would have been obvious to incorporate the method of using a polynomial equation from a look up table to predistort a baseband signal as disclosed in Miyashita into the combination to correct distortion impairing linearity which occurs in the amplifier (column 3, lines 31-33).

8. Claims 17, 21, 30 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US 5,920,808) in view of Shin et al (US 6,493,543)

Regarding claims 17, 21, 30 and 34, Jones discloses an apparatus and method for adaptively predistorting a baseband signal (figure 2). The predistorter 107 predistorts the received in-phase and quadrature component signals to compensate for the distortion of the power amplifier 115. The predistorted 800 ksps component signals from

the predistorter 107 are received by the digital interpolator 209 (column 7, lines 22-29). The signals are upsampled in the digital interpolator to increase the sampling (column 7, lines 28-42). The interpolator filters the upsampled base band signal (column 7, lines 42-43). The output of the interpolator is a predistorted upsampled signal, which is converted to RF signal for transmission. A receiver retrieves samples of the RF signals and feeds these signals to the trainer 131 (figure 2).

Jones does not disclose the receiver being tuned to at least one specific frequency offset from a carrier frequency of the output signal. Shin discloses the control system 104 measures the energy of the distortion frequency components by measuring energy at a frequency or frequency offset from a carrier frequency. The feedback control signal on line 109 is coupled to the predistorter 105 for adjusting characteristics of the predistorter and thereby null the energy in the out-of-band signals on line 103 (column 5, lines 33-45). It would have been obvious for one of ordinary skill in the art at the time of the invention to incorporate the teachings of Shin into the apparatus and method of Jones to measure the energy of distortion frequency components and to remove out-of-band signals. This would remove noise from the signal to be transmitted and allow error free transmissions to be sent to the receiver.

Allowable Subject Matter

9. Claims 6, 14 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Chow et al (US 6,614,854) discloses predistorting a baseband signal according to received power levels in a small bandwidth (column 2, lines 10-17; column 4, lines 1-8 and figures 1A and 2).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M. Burd whose telephone number is (571) 272-3008. The examiner can normally be reached on Monday - Thursday 9 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kevin M. Burd
3/31/2005

KEVIN BURD
PRIMARY EXAMINER